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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
ALANKO, ANITA KAREN	

ART UNIT	PAPER NUMBER
1765	

DATE MAILED: 06/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/633,241	BATTAL ET AL.	
	Examiner	Art Unit	
	Anita K. Alanko	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-21 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-21 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 7/31/03.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-7, 9-10, 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amartur (US 6,664,557 B1).

Amartur discloses a method comprising:

providing light ("broad band light source", col.7, lines 2-7) on an area of a surface of a semiconductor wafer 300 (Fig.2B);

receiving light reflected from said area of said surface (Fig.4, step 402, receiving reflectance data);

analyzing a reflectance spectra (Fig.4, steps 404-422); and

repeating said steps listed hereinabove (if in step 422 the sum is not greater than a threshold) until an intermediate reflectance spectra is identified that has a sinusoidal shape when normalized (normalized in step 404, sinusoidal when curve changes from 502 to 504 in Figure 5).

Amartur fails to disclose whether the light source is continuous or pulsed. Examiner takes official notice that continuous and pulsed light sources are conventional in optical monitoring methods. It would have been obvious to one with ordinary skill in the art to use a pulsed light source in the method of Amartur because they are conventional sources of light.

As to claim 2, since Amartur has the same method as in the instant invention, it is expected to encompass having changing spectra when a different material is exposed (see Figure 3).

As to claim 3, Amartur teaches that overpolishing is conventional in order to ensure that all conductive material is removed (col.3, lines 35-37). It would have been obvious to one with ordinary skill in the art to overpolish for a predetermined time period to ensure said layer of material is removed because Amartur teaches that this is useful during CMP of conductive material.

As to claim 4, examiner takes official notice that overpolishing and then stopping after a predetermined time period is conventional in the art. It would have been obvious to one with ordinary skill in the art to do so in the method of Amartur because it is conventional in the art.

As to claim 5, Amartur discloses to use a broad band spectrum of light and to analyze the reflected light over a plurality of wavelengths (col.7, lines 2-7).

As to claim 6, Amartur does not disclose the cited wavelength, however examiner takes official notice that it is conventional in the art. It would have been obvious to one with ordinary skill in the art to use the cited wavelength range in the method of Amartur because it is conventional in the art.

As to claim 7, Amartur discloses to use fast fourier transform analysis (step 416).

As to claim 9, it would have been obvious to use the cited pulse length since it is conventional for optical monitoring techniques in order to optimize the process for best results.

As to claim 10, it is expected that the spot size is as cited in Amartur since the same method with the same results are obtained as in the instant invention.

As to claim 18, see the rejections above. Amartur teaches to form a trench in a dielectric layer 102 (Fig.1A) with a barrier material 104, copper 106, and CMP to have copper remain in the trench (Fig.1B). It would have been obvious to use the method of Amartur to remove the barrier layer as cited because Amartur teaches that the normalization and analysis technique is useful for such structures.

As to claims 19-20, see the rejection of claim 3-4.

As to claim 21, Amartur teaches that tantalum is a useful barrier material (col.1, line 52), which would have likewise been obvious to incorporate into the method of Amartur.

Claims 8, 11-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amartur (US 6,664,557 B1) in view of Johnson et al (US 6,340,602 B1).

As to claim 8, Amartur does not disclose to take a diversity of spectra such than an entire surface is represented. Johnson teaches that it is useful to illuminate several zones with broad

band light to represent an entire surface of the semiconductor wafer (see abstract, Fig.10). It would have obvious to one with ordinary skill in the art to illuminate several zones with broad band light to represent an entire surface of the semiconductor wafer as cited in the method of Amartur because Johnson teaches that this is a useful technique in optical analysis of wafers.

As to claim 11, it would have been obvious to one with ordinary skill in the art, that if several zones are analyzed, as taught to be useful by Johnson, that this would be done with multiple probes in the modified method of Amartur because multiple probes would save time compared to one probe to monitor a corresponding multiple number of areas of the substrate.

As to claim 12, since the wafer, polishing pad and table are all concentric, it would have been obvious to one with ordinary skill in the art that the zones are also concentric in order to efficiently monitor the complete surface.

As to claim 13, see the rejection of claim 8. Amartur discloses to monitor multiple reflectance spectra as cited.

As to claim 14, see the rejection of claim 6.

As to claim 15, the spectra changes from a linear to sinusoidal shape (when curve changes from 502 to 504 in Figure 5).

As to claim 16-17, see the rejection of claims 3-4.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited art shows methods of polishing and optical monitoring.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anita K. Alanko whose telephone number is 571-272-1458. The examiner can normally be reached on Mon-Fri until 2:30 pm (Wed until 11:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Anita K. Alanko

Anita K Alanko
Primary Examiner
Art Unit 1765